1. **GENERAL INFORMATION :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Serial No. |  |  | Rated Voltage | 48-250 V DC |
| Make |   | Aux. Voltage | 57-120V AC |
| ORDER NO. | KAVS10001T15JEN | MODEL NO. | KAVS100 |
| Frequency | 50/60 Hz | VT Ratio | 380kV/115V |

1. **MECHANICAL CHECKS AND VISUAL INSPECTION:**



|  |  |  |
| --- | --- | --- |
| ITEM | DESCRIPTION | CHECKED |
| 1 | Inspect for physical damage / defects. |  |
| 2 | Check tightness of all connections. |  |

#### WATCHDOG CONTACTS:

|  |  |  |
| --- | --- | --- |
| **Terminals** | **Contact Status** | **Results** |
| **Relay De-energized** | **Relay Energized** |
| 3-5 | CLOSED | OPEN |  |
| 4-6 | OPEN | CLOSED |  |

1. **OPERATING DC SUPPLY CURRENT:**

|  |  |  |  |
| --- | --- | --- | --- |
| DC Volt (V) | DC CurrentWithout Fault (mA) | DC CurrentDuring Fault (mA) | Calculated WATT (W) |
| 125VDC |  |  |  |

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Accuracy : Without Operation : 2.75 – 3 W

Operation with 2 relays : 4 – 4.5 W

1. **FUNCTIONAL TESTS:**

#### MEASUREMENTS CHECK

VT RATIO SETTING: 3304 (= 380kV/115V)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Actual Value Injected | Relay Metered Value | EXPECTED VALUE |
| Line Voltage | 115 V |  | 380 KV |
| 66.4 V |  | 219.4 KV |
| Bus Voltage | 115 V |  | 380 KV |
| 66.4 V |  | 219.4 KV |

Accuracy : + or – 5% of reading (+ or – 1% of Vn typical)

* 1. **Phase angle element and system angle element**

|  |  |  |  |
| --- | --- | --- | --- |
| Angle Setting In Degree | OPERATION | Phase Angle | System Angle |
| 20 | Operate |  |  |
| Reset |  |  |
| 45 | Operate |  |  |
| Reset |  |  |

Accuracy: Operation – Setting -3 +0, Resets – Operate value -0 +3 (Service Manual Page 49/80)

* 1. **SYNCHRONISM TIMER**

|  |  |
| --- | --- |
| TIMER SETTING | Operating Time(sec) |
| Phase Angle Time Delay | System Angle Time Delay |
| 0.1sec |  |  |
| 0.2sec |  |  |

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Accuracy: + or – 0.5% + 0 to 40ms

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* 1. **UNDER VOLTAGE ELEMENT**

|  |  |  |  |
| --- | --- | --- | --- |
| Under Voltage Setting P-N secondary | OPERATION | V Line | V Bus |
| 30 V | Operate |  |  |
| Reset |  |  |
| 40V | Operate |  |  |
| Reset |  |  |

Accuracy: Operation; + or - 5% of the set value, Reset;<105% of Operation

* 1. **DIFFERENTIAL VOLTAGE ELEMENT**

|  |
| --- |
| **Varying V Line :** |
| Diff. Voltage Setting P-N Secondary | OPERATION | V Line | V Bus |
| Low |  | High |  |
| 5.5 V | Operate |  |  |  |  | 115 V |
| Reset |  |  |  |  | 115 V |
| 10 V | Operate |  |  |  |  | 115 V |
| Reset |  |  |  |  | 115 V |

|  |
| --- |
| **Varying V Bus :** |
| Diff. Voltage Setting P-N Secondary | OPERATION | V Bus | V Line |
| Low |  | High |  |
| 5.5 V | Operate |  |  |  |  | 115 V |
| Reset |  |  |  |  | 115 V |
| 10 V | Operate |  |  |  |  | 115 V |
| Reset |  |  |  |  | 115 V |

Accuracy: Operation; + or -5% of the set value, Reset; >97% of Operation

* 1. **VOLTAGE MONITORS**
		1. **Dead Line/ Live Bus**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Voltage Setting P-N secondary | V Line | V Bus | Result | Dead Line/ Live Bus |
| L/B Dead-25VL/B Live-50V |  |  | OPERATED |  |
|  |  | RESET |  |

* + 1. **Dead Bus / Live Line**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Voltage Setting P-N secondary | V Line | V Bus | Result | Dead Bus/ Live Line |
| L/B Dead-25VL/B Live-50V |  |  | OPERATED |  |
|  |  | RESET |  |

* + 1. **Dead Bus / Dead Line**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Voltage Setting P-N secondary | V Line | V Bus | Result | Dead Bus/ Dead Line |
| L/B Dead-25V |  |  | OPERATED |  |
|  |  | RESET |  |

Accuracy: Live Voltage - Operation + or – 5% of set value; Reset < 98% of operation

Dead Voltage - Operation + or – 5% of set value; Reset < 104% of operation

* 1. **SYSTEM SPLIT ELEMENT:**

|  |  |  |
| --- | --- | --- |
| **Angle Setting In Degree** | **OPERATION** | **SPLIT ANGLE** |
| 100 | Operate |  |
| Reset |  |
| 110 | Operate |  |
| Reset |  |

Accuracy: Operation setting +0 -3; Resets operate value -3 +0

* 1. **SPLIT TIMER:**

|  |  |
| --- | --- |
| **TIMER SETTING****(sec)** | **Split Angle Time Delay****(sec)** |
| 0.5 sec |  |
| 1 sec |  |
| 2 sec |  |

Accuracy: + or – 0.5% + 0 to 40ms

* 1. **SLIP FREQUENCY BLOCKING**

|  |  |  |  |
| --- | --- | --- | --- |
| SLIP FREQ. SETTING | BLOCKING | Slip Freq with Phase Angle | Slip Freq. with System Angle |
| operate | reset | operate | reset |
| 0.1 Hz | High blocking | Hz | Hz | Hz | Hz |
| Low blocking | Hz | Hz | Hz | Hz |
| 0.2 Hz | High blocking | Hz | Hz | Hz | Hz |
| Low blocking | Hz | Hz | Hz | Hz |

Accuracy: + or – 0.010 Hz

1. **FINAL SETTING TEST:**
	1. **Phase angle element and system angle element**

|  |  |  |  |
| --- | --- | --- | --- |
| **Angle Setting In Degree** | **OPERATION** | **Phase Angle** | **System Angle** |
| **20°** | Operate |  |  |
| Reset |  |  |

* 1. **SYNCHRONISM TIMER**

|  |  |
| --- | --- |
| **TIMER SETTING** | **Operating Time (sec)** |
| **Phase Angle Time Delay** | **System Angle Time Delay** |
| **0.100 sec** |  |  |

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* 1. **UNDER VOLTAGE ELEMENT**

|  |  |  |  |
| --- | --- | --- | --- |
| **Under Voltage Setting** **P-N secondary** | **OPERATION** | **V Line** | **V Bus** |
| **53 V** | Operate |  |  |
| Reset |  |  |

* 1. **DIFFERENTIAL VOLTAGE ELEMENT**

|  |
| --- |
| **Varying V Line :** |
| **Diff. Voltage Setting P-N Secondary** | **OPERATION** | **V Line** | **V Bus** |
| **Low** | **High** |
| **10 V** | Operate |  |  |  |  | 115 V |
| Reset |  |  |  |  | 115 V |

|  |
| --- |
| **Varying V Bus :** |
| **Diff. Voltage Setting P-N Secondary** | **OPERATION** | **V Bus** | **V Line** |
| **Low** | **High** |
| **10 V** | Operate |  |  |  |  | 115 V |
| Reset |  |  |  |  | 115 V |

* 1. **VOLTAGE MONITORS**
		1. **Dead Line/ Live Bus**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Voltage Setting P-N secondary | V Line | V Bus | Result | Dead Line/ Live Bus |
| L/B Dead-19VL/B Live-56V |  |  | OPERATED |  |
|  |  | RESET |  |

* + 1. **Dead Bus / Live Line**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Voltage Setting P-N secondary | V Line | V Bus | Result | Dead Bus/ Live Line |
| L/B Dead-19VL/B Live-56V |  |  | OPERATED |  |
|  |  | RESET |  |

* + 1. **Live Bus / Live Line**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Voltage Setting P-N secondary | V Line | V Bus | Result | Live Bus/ Live Line |
| L/B Live-56V |  |  | OPERATED |  |
|  |  | RESET |  |

* 1. **SLIP FREQUENCY BLOCKING**

|  |  |  |  |
| --- | --- | --- | --- |
| SLIP FREQ. SETTING | BLOCKING | Slip Freq with Phase Angle | Slip Freq. with System Angle |
| operate | reset | operate | reset |
| 0.1 Hz | High blocking | Hz | Hz | Hz | Hz |
| Low blocking | Hz | Hz | Hz | Hz |